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Spaces Still Available for NAMA 2016 SHENANDOAH FORAY!

There are still slots available for NAMA's 2016 foray this September 8-11 in Front Royal, VA. Don't miss out on this unique foray -- sign up today!*

Exciting partnership with Shenandoah National Park. We are thrilled that many of this year's field trips will be in Shenandoah National Park, authorized under a special research permit and "Bioblitz" designation. This gives NAMA members a unique opportunity to pick mushrooms in the park and contribute to a better understanding of the park's mycoflora. We really hope you'll join in on this project.

Fantastic Faculty. As you know, field trips are only a part of the foray: at any given point on Friday and Saturday there also will be multiple presentations and workshops running. Speakers and workshop leaders will include:

- **Denis Benjamin**
- **Alan and Arleen Bessette**
- **Catherine Aime**
- **Michael Castellano**
- **Tradd Cotter**
- **Roy Halling**
- **Susan Hopkins**
- **Mark Jones**
- **Jay Justice**
- **Ryan Kepler**
- **Patrick Leacock**
- **James Lendemer**
- **Gary Lincoff**
- **Brian Looney**
- **Shannon Nix**
- **Conrad Schoch**
- **Ann and Rob Simpson**
- **Dorothy Smullen**
- **Walt Sturgeon**
- **Rod Tulloss**
- **Debbie Viess**
- **Rytas Vilgalys**

You can read more about the faculty, workshops and walks (and see the great **foray tshirt**!) on the NAMA website (http://namyco.org/nama_shenandoah_foray.php). ***To register go to** http://mms.namyco.org/members/evr/reg_event.php?orgcode=NAMA&evid=7001739.

Great Location. The foray location is just 15 minutes away from Front Royal, VA, the northern gateway to Shenandoah National Park. It's a beautiful area with abundant opportunities to explore the park, the Appalachian Trail, the Shenandoah River, and Civil War sites -- and just over an hour away from all the sites and culture that Washington, DC has to offer.

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UPCOMING FORAYS & OTHER EVENTS

The events page of *The Mycophile* publicizes forays and events of NAMA affiliated clubs which may be of interest to our members. If you would like to list your club's next big event, contact Dianna Smith, Editor: mycophile@namyco.org. Include date, location, brief description, link for information, and host organization name. To post your event on the NAMA website, contact the webmaster: webmaster@namyco.org.

July 22-23: West Virginia Mushroom Club Foray with Gary Lincoff, Walt Sturgeon, Kim and John Plischke III, Todd Elliot and Max Dubansky. For detailed information and foray registration go to http://wvmushroomclub.org/.

July 28-31: Northeast Mycological Federation (NEMF) 40th Annual Sam Ristich Foray will be held at Fitchburg State University in central MA close to the NH border. Registration is now closed.

July 31-August 6: *Mushroom Identification for New Mycophiles: Foraging for Edible and Medicinal Mushrooms* with Greg Marley and Michaeline Mulvey at Eagle Hill Institute, Maine, http://www.eaglehill.us

August 4: Deadline for NAMA 2016 Fungi Photography Awards.

August 7-13: Eagle Hill Institute Seminar on *Slime Molds: Miniature Marvels of Nature* with Steven Stephenson, http://www.eaglehill.us

August 18-21: Wildacres Foray (Note the August date - first time). Cost will be $240 per person, double occupancy. Dr. Andrew Methven will return as our guest mycologist.

August 21-27: *Polypores and other Wood-inhabiting Fungi* with Tom Volk, Eagle Hill Institute, Maine, http://www.eaglehill.us

September 8-11: NAMA Shenandoah Foray located in the unique environment of the bio-regions of the Blue Ridge Mountains and the Shenandoah Valley of Virginia. Walt Sturgeon will be chief mycologist. The foray will be stationed at the Northern Virginia 4-H Center in Front Royal. http://www.nova4h.com/#landing. Registration opens May 15, 2016.

September 24: Western Pennsylvania Mushroom Club's 16th Annual Gary Lincoff Mushroom Foray with Gary Lincoff, Nicolas Money and Chef George Harris. Go to http://www.wpamushroomclub.org/ to register.

September 22-25: Annual COMA Clark Rogerson Foray located in Copake NY in the Berkshires at the intersection of NY, CT and MA. Check for updates and registration online at www.comafungi.org.

October 17-22: 17th International Fungi & Fibre Symposium, Madeira Park, British Columbia. http://fungiandfibre2016.org.

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NAMA 2016 Foray Lodging Options Still Available!

Private rooms on the campus of the 4-H Center are all full, but there are still spaces available in other great lodging options:

- "'dorm" rooms in two high-ceilinged mountain lodges on campus. (If you gather a group of 3 or more, you can request your own room or just sign up and we'll find you some roommates.)
- camping on campus. (Sorry, no RV hookups are available.)
- hotel rooms a short drive away.

One of the lodges on the 4--H Center Campus

If you have any questions, please don't hesitate to contact the foray registrar, Connie Durnan, at conniedurnan@gmail.com or (202) 669-5740.

*REGISTER for the Shenandoah Foray Today!!! http://mms.namyco.org/members/evr/reg_event.php?orgcode=NAMA&evid=7001739

NAMA President's Message

By David Rust

Volunteers perform countless hours of behind the scenes work to make organizations like NAMA a success. This newsletter is made possible through the devotion of editor Dianna Smith, who puts together each issue with care and deliberation. For over three decades, Ann Bornstein managed the membership database, processed countless checks, updated member information, often served as foray registrar, and produced a directory. The membership process is a bit easier for Steve Bichler, thanks to online membership renewal, but the task still requires a lot of time and attention to detail.

NAMA recently lost one of our most dedicated and diligent volunteers: Treasurer Herbert Pohl, who passed away on May 1 after a long illness. Herb was a devoted member of the New Jersey Mycological Association. When Herb took over as NAMA treasurer in 2012, he brought discipline and certainty, and quickly established a reputation for being a stickler on policy. Under Herb's watchful eye, NAMA had five straight very profitable years. Previously, he was chair of the Finance Committee, and helped grow our endowment toward its goal of $100,000. Herb and Ursula Pohl also a played key role in organizing the silent auction; 2015 was the best year ever for this fundraising effort. His many years of hard work are deeply appreciated and Herb will be greatly missed by all his NAMA friends.

Former NAMA president and treasurer Ike Forester has agreed to serve as treasurer for a short term. Thank you, Ike! Melodie Gates, South Sound Mushroom Club, has graciously volunteered to take on the job as NAMA treasurer. I look forward to working with Melodie, starting July 1. She has maintained the South Sound bank account for almost 20 years.

Please welcome Nancy Ward as the NAMA Regional Trustee for Appalachia. She was recently elected to a three year term. Nancy is currently president of the West Virginia Mushroom Club. Nancy helped revive the club 12 years ago with Shelly Conrad, Nelle Chilton, and Martha Hopper. Nancy is recently retired and hopes to devote more time to mycology.

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NAMA needs a few people to add content to the website. Specifically, I want to shed duties as webmaster; if you're willing, I'd like to hear from you. We need someone to help implement some of the bells and whistles available to us through our web hosting service.

We ran a survey in the last issue of *The Mycophile*. In the coming months, we will expand this request for more input from our members. Since I'm just starting a new term as President, I'd like to pose a question: What areas would you like to see NAMA expand and improve 3-5 years from now? What goals should we take on for communication, forays and foray content, specific topics you'd like to see more of? Let me know by email: president@namyco.org.

Don't forget about the annual Photography Contest. The deadline for entry is August 4. Contest rules can be found here: http://www.namyco.org/photography_contest_rules.php

Finally, I hope you're planning to attend the NAMA 2016 Shenandoah Foray in Front Royal, Virginia, September 8-11, 2016. Registration is still open. Our chief mycologist will be Walt Sturgeon, well-known field mycologist and author. The foray is hosted by The Mycological Association of Washington DC and the New River Valley Mushroom Club. See you in Virginia! It's going to be a great foray.

Fungi in the News

'Intestinal Fungi May Aid in Relief of Inflammatory Disease' by Geri Clark, *Cornell Chronicle*, June 22, 2016 (http://www.news.cornell.edu/stories/2016/06/intestinal-fungi-may-aid-relief-inflammatory-disease).

'University Administrator Wears 'Bee Beard' to Raise Money for Research Center' by Daniel Uria, *UPI*, June 22, 2016 (http://www.upi.com/Odd_News/2016/06/22/University-administrator-wears-bee-beard-to-raise-money-for-research-center/9091466607160/).

'Plant Kingdom Provides Two New Candidates for the War on Antibiotic Resistance', Trinity College, Dublin, June 20, 2016, *Science Daily*, June 20, 2016 (https://www.sciencedaily.com/releases/2016/06/160620112249.htm).

'Discoveries of Fungi-Insect Relationships May Lead to New Evolutionary Discoveries' by Meg McLaurin of Penn State, May 24, 2016, *Science Daily* (https://www.sciencedaily.com/releases/2016/05/160524124404.htm).

Taylor Lockwood's New Bioluminescent Mushroom Video: https://youtu.be/7OBuoWczAaQ.

NAMA Annual Photography Contest Deadline is August 4th!

Subject Material

For Pictorial and Documentary, organisms from the Myxomycota (slime molds) and the phyla Basidiomycetes and Ascomycetes of the Eumycota ("true fungi") are eligible. For Judges' Option, nearly anything goes, so long as the theme relates to fungi, and fungi are a key element of the photograph.

To enter the NAMA photography contest, mail or email your entries to:
John Plischke III
411 Center Avenue
Greensburg PA 15601
(724) 832-0271
Email John Plischke III: fungi01@aol.com.

Three Popular Medicinal Mushroom Supplements: A Review of Human Clinical Trials*

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Abstract

There are many mushroom supplements on the market claiming a variety of health benefits, and it is difficult to discern which of these claims are backed by reliable research. Most of the existing research is conducted using either human cells or animal models rather than human participants. Without being tested directly on humans, this research has limited application. A review of the literature reveals a relatively small number of studies have been conducted using human patients and those that do exist vary widely in study design and quality.

This article brings together the existing studies that involve human participants for three popular mushroom species that are commonly consumed as dietary supplements. The three species reviewed are *Agaricus blazei* or royal sun agaric, I*nonotus obliquus* or chaga, and *Ganoderma lucidum* or reishi. Each study described includes the study's design, the condition being treated, the preparation, dosage, and duration of treatment, the number of subjects, and a summary of the results.

The outcome of these studies is variable and caution is recommended when extrapolating the results. Many factors — such as poor study design, small sample sizes, lack of replication, mushroom variability, and problematic statistical methods — make it difficult to rely on the results of any individual study. Further research using well-designed clinical trials is needed to establish medicinal benefits for these three mushroom species.

Introduction

Mushrooms have long been used as medicine in cultures throughout the world. In recent years many species have become popular dietary supplements to promote health. For some mushrooms, a great deal of research on potential health benefits has been conducted, while for others there is very little scientific support. In spite of this, countless mushroom supplements are available on the market with preparations, doses, and health claims that vary widely between manufacturers.

It is difficult to determine if the consumption of various mushroom supplements provides health benefits. Supplement companies often cite specific research to support their claims, but most of this has been conducted in vitro or using animal models, usually mice and rats. While this information can suggest possible value, there are differences in biochemical, physiological, and anatomical characteristics between animal models and humans. Caution is needed when extrapolating the results of this research to supplements prepared for human use. The number of studies of human subjects published in peer-reviewed literature is relatively small and were performed under variable conditions (Leonard 2015).

This review draws together all of the human clinical trials found in the peer-reviewed literature for three popular mushroom supplements. Each of these three mushrooms species is consumed for medicinal purposes, is widely obtainable, and is sold in dietary supplement form by multiple companies.

While the included trials provide a succinct view of the research that has been conducted thus far, they do not indicate the reliability of the research. Many factors — such as study design, small sample sizes, lack of replication, mushroom variability, problematic statistical methods, and others — make it difficult to rely on the outcomes of the research. This paper is not designed to evaluate each individual study or to substantiate or refute the claims of any mushroom supplement companies, but rather to provide a view of the available research that has been conducted on human subjects.

Editor's note: To see the extensively detailed tables depicting the Clinical Human Studies for each of the three kinds of mushroom supplements, go to http://www.namyco.org/three_medicinal_mushroom_supplements.php.

Methods

In this review, all the available human studies, including clinical, epidemiological, and case studies were assessed. All of the studies were found by searching the mushroom's name in *Web of Science* (1945–April 2015), BIOSIS (1980–April 2015), MEDLINE (up to April 2015), and clinicaltrials.gov (up to April 2015). Human studies referenced in review articles found after 2005 were also considered. Included studies were limited to those published in peer-reviewed journals and which involved at least ten subjects. Peer-review status was determined using Ulrichsweb (2015). The validity of the included publications was also assessed using Beall's List of Predatory Open Access Publishers (https://scholarlyoa.com/publishers/)(2015).

Studies where the intervention consisted of multiple ingredients, such as a combination of herbs and mushrooms rather than a single mushroom species, were excluded. No restrictions were placed on date, language, or study design. Where the article could not be read in its original form, the information was taken from a translation, a review article, or from the article abstract. When applicable, this is noted within the respective tables.*

Many of the claims made by supplement companies and included in this review are not medical terms and are taken directly from product labels or websites (Swanson Superior Herbs 2015; Myriad Mycology 2015; Mushroom Wisdom 2015; Terrasoul 2015).

The information provided for each of the three species includes a description of the mushroom, its native range, some of its uses in folk medicine, claims from supplement companies, a brief summary of in vitro and in vivo animal research, and a table outlining the existing human studies. Each table includes the available information on study design, preparation, dosage, subjects, duration, and a summary of the results.

Agaricus blazei (A. subrufescens, A. sylvaticus, A. rufotegulis or A. brasiliensis) Common names: almond portobello, royal sun agaricus, princess matsutake, royal agaricus, royal sun blazei, cogumelo do sol (Brazil), himematsutake (Japan)

Figure 1. Agaricus blazei, commonly known as the almond portobello mushroom. Reprinted from Wikimedia Commons, by H. Krisp, n.d., accessed September 23, 2015. Copyright 2013 CC BY-SA 3.0.

Agaricus blazei is commonly consumed for medicinal purposes in both Brazil and Japan (Xu, Beelman, and Lambert 2012). Its flavor is characterized by an almond fragrance and a sweet taste. It is closely related to the white button mushroom, *Agaricus bisporus*, regularly eaten in the United States (Kerrigan 2005). In the wild, *A. blazei* is somewhat rare but has a wide distribution, growing throughout much the world. It has been assigned several scientific names in different regions — *A. subrufescens, A. sylvaticus, A. rufotegulis, or A. brasiliensis* — but all are now considered the same species (Kerrigan 2005).

In Brazil, *A. blazei* has historically been used to fight physical and emotional stress, to stimulate the immune system, and to prevent or treat a variety of medical conditions such as diabetes, high cholesterol, osteoporosis, peptic ulcers,

digestive problems, and cancer (Firenzuoli, Gori, & Lombardo 2008). Today, supplement companies advertise the benefits of *A. blazei* with claims that it "shows promise as anti-cancer and anti-tumor medicine" and provides "cellular-level immune system support" (Myriad Mycology "blazei"; Swanson Superior Herbs "blazei"). *A. blazei* is one of the more commonly researched medicinal mushrooms. A large number of in vitro studies have demonstrated a variety of effects including antitumor, antiviral, anti-inflammatory, antidiabetic, and anti-allergic properties (Wang, Fu, & Han 2013). In vivo animal research has displayed its ability to improve the efficacy of hepatitis B vaccines, stimulate immune response to leukemia, and promote T cell proliferation (Wang, Fu, & Han 2013). *A. blazei* contains several immunostimulatory compounds such as β-1, 3-D-glucans, glucomannan, and proteoglycans (El Enshasy & Hatti-Kaul 2013).

Like the other mushrooms in this review, relatively few human studies for *A. blazei* have been documented in peer-reviewed journals. Table 1 lists those that meet the requirements for this review, 11 studies in all. In addition to those in Table 1, five clinical trials can be found on clinicaltrials.gov. The earliest began in 2005 and the latest in 2011. These trials tested the effects of *A. blazei* on patients with hepatitis C, multiple myeloma, inflammatory bowel disease, and type 2 diabetes mellitus. The results of two of the five trials can be found in Table 1 (Tangen et al. 2015; Hsu et al. 2007). The results of two were not located in the literature search, and the fifth trial exploring the effect of *A. blazei* treatment on inflammatory bowel disease is listed as currently recruiting patients (clinicaltrials.

Inonotus obliquus

Common Names: Chaga (Russia), birch fungus, white rot fungus, kabanoanatake (Japan)

Figure 2. *Inonotus obliquus*, commonly known as birch fungus. Reprinted from Wikimedia Commons, by H. Baker, n.d., accessed September 23, 2015. Copyright 2011 CC BY-SA 3.0.

Inonotus obliquus is a polypore mushroom that grows as a plant pathogen on the trunk of birch trees in northern latitudes throughout the world (El Enshasy & Hatti-Kaul 2013). *I. obliquus* can only be collected from living or freshly cut, mature birch trees. On dry standing or fallen trees, the mushroom dies, and the content of active compounds decreases dramatically (Shashkina, Shashkin, & Sergeev 2006).

The Tartars of West Siberia traditionally used *I. obliquus* to treat "tuberculosis, gastrosia, liver diseases, heart diseases, and ascariasis" (Zhong et al. 2013). It is currently used to treat various disorders including gastrointestinal cancer, as well as cardiovascular disease and diabetes in Russia, Poland, and most of the Baltic countries (Zhong et al. 2013). Supplement companies that sell *I. obliquus* in the United States claim that it has demonstrated "a variety of beneficial cardiovascular actions and immune supporting benefits" and that it is "currently being used in numerous cancer studies" and "being studied for its ability to treat the virus HIV" (Mushroom Wisdom "chaga"; Myriad Mycology "chaga").

I. obliquus has a high content of compounds such as β-glucans that may affect the immune system, (El Enshasy & Hatti-Kaul 2013) and secondary metabolites, including phenolic compounds, melanins, and lanostane-type triterpenoids (Zhong et al. 2013).

Despite the small number of human studies, in vitro and in vivo animal studies have been extensive.

I. obliquus has exhibited anticancer activity in various types of tumor cells. In vitro studies have demonstrated antiviral effects, platelet aggregation inhibitory activities, and anti-inflammatory and analgesic properties (Zhong et al. 2013). In vivo, antitumor activity, antioxidant activity, and an increase in hypoglycemic activity have all been demonstrated in mice (Zhong et al. 2013).

Although there is widespread use in Russia (Zhong et al. 2013), only two human studies were found in the peer-reviewed literature, and both are over 30 years old, as seen in Table 2.* No controlled studies designed to assess the safety of *I. obliquus* were found and no studies were reported on clinicaltrials.gov (2015). Like many mushroom supplements, most of the evidence for safety and efficacy appear to be based on *I. obliquus*'s long traditional use.

Ganoderma lucidum

Common Names: reishi (Japan), ling-zhi (China), spirit plant, mushroom of immortality

Figure 3. *Ganoderma lucidum*, commonly known as spirit plant. Reprinted from Wikimedia Commons, by E. Steinert, n.d., accessed September 23, 2015, http://commons.wikimedia.org/wiki/File:Ganoderma_lucidum_02.jpg. Copyright 2005 CC BY-SA 2.5-2.0-1.0.

Ganoderma lucidum can be found growing on plum trees throughout Asia and in other parts of the world. It has a long history of use in Japanese and Chinese traditional medicine to "increase energy, stimulate the immune system, and promote health and longevity" (Chang & Buswell 1999). Modern uses of *G. lucidum* include treatment for coronary heart disease, arteriosclerosis, hepatitis, arthritis, nephritis, bronchitis, hypertension, cancer, and gastric ulcers (Boh 2007). Claims from supplement companies include its use in treating "insomnia, allergies, liver disease, anxiety, rheumatoid arthritis, and various forms of cancer" as well as its ability to "build resistance to illness, detox the body, and calm the nerves" (Myriad Mycology "reishi"; Terrasoul "reishi").

Not only is *G. lucidum* one of the most frequently consumed dietary supplements, it is one of the most well-researched mushrooms. A wide range of in vitro and in vivo animal studies have been conducted to investigate the various health benefits of *G. lucidum*. These have provided evidence to suggest it has the potential to reduce the immunosuppressive response induced by anticancer drugs and abate autoimmune diseases. *G. lucidum* has also demonstrated anti-inflammatory, antidiabetic, antiviral, and antibacterial activity both in vivo and in vitro (Boh et al. 2013). This mushroom contains more than 50 types of polysaccharides and peptide-polysaccharides complexes in addition to about 120 bioactive compounds (El Enshasy & Hatti-Kaul 2013).

Many of the clinical trials for *G. lucidum* were designed to test its adjuvant use in cancer therapy although a variety of other conditions have also been studied. Twenty-six studies met the requirements of this review and are included in Table 3.* Four additional trials involving the treatment of Parkinson's disease, rheumatoid arthritis, and pediatric cancer were found on clinicaltrials.gov. One of these trials was not located in the literature search, and two did not meet the review criteria (Shing et al. 2008; Li et al. 2007). The fourth trial looking at the effect of *G. lucidum* on patients with head and neck cancer is currently recruiting patients (clinicaltrials.gov 2015).

Discussion

While there is value in combining the available clinical trials for these three mushroom species, it is import-

ant to address the difficulties involved in evaluating this kind of research. Many factors make it challenging to ascertain the health benefits of mushroom supplements.

First, there are a number of different purposes for conducting clinical trials. Some of the studies included in this review were designed to assess the safety and side effects of mushroom consumption. Others measured specific physiological effects such as natural killer cells activity or plasma insulin levels (Ahn et al. 2004; Chu et al. 2012). Several used patient reporting methods to measure subjective effects such as pain or quality of life (Fu & Wang 1982; Zhao et al. 2012). A small number were designed to measure the outcome of treatment for a specific disease (Oka et al. 2010; Dosychev & Bystrova 1973). Each of these end results provides useful information for further research, but none are designed to provide conclusive evidence.

For example, phase I clinical trials, sometimes called preliminary or pilot studies, like Zhao et al. (2013) or Ohno et al. (2011), are generally designed to evaluate a treatment's safety, establish a dosage range, and identify side effects (clinicaltrials.gov 2015). This information is used to determine if further research can safely be conducted. Twelve of the 39 clinical trials included in this review were specifically designated as phase I, pilot, or preliminary trials, although at least five others reported information on safety and side effects.

Variations in study design also affect how results are evaluated. Open label studies, such as Yoshimura et al. (2010), are structured so that both the patients and investigators are aware of the treatment the patient is receiving (clinicaltrials.gov 2015). These studies do not control for human bias, so while they may indicate the potential benefit for further research, they don't provide stand-alone evidence. Double-blinded studies, where neither the patients nor the investigator know if the patient is receiving the test substance or a placebo, are needed to support the results. Only 13 of the 39 trials in this review were double-blinded.

Other design characteristics, such randomization and placebo controls, are needed to achieve reliable results. Both were present in only 21 of the included studies. Sample sizes also impact the evaluations of results. Small sample sizes make it impossible to determine the likelihood that the reported results, whether positive or negative, are significant. This commonly produces publications with questionably positive results (Reinhart 2015, pp. 23–28). (Editor's note: What one needs to know is how many people are benefited or harmed by the medication and how large is the effect, positive or negative, compared with exisitng treatments, etc.). Only four of the studies in this review had sample sizes with 100 or more patients.

Another challenge that arises while evaluating a body of research is the strong incentive among researchers to publish studies with positive results. Because there is no general standardization for data analysis in clinical trials, it is common for researchers to choose those statistical methods that provide a statistically significant outcome. While this is not necessarily intentional, it does tend to produce results that appear more favorable to a researcher's hypothesis than the data may warrant (Reinhart 2015, pp. 4–5).

Conversely, there is often an inability or lack of incentive to publish negative reslts. Journals looking for impactful research may be less likely to publish a study that shows no measurable benefit for mushroom consumption (Reinhart 2015, pp. 24–25). Researchers also may abandon a study that shows no effect in pursuit of other, more promising, research. Or, they may measure a number of indices during treatment but choose to publish only those indices that show statistical significance. As a result, the body of available research is generally skewed toward studies that show a positive effect. There were 36 trials in this review that measured indices beyond side effects; 25 of these reported positive effects with treatment. Of those completed studies that were reported on clinicaltrials.gov, three of seven were not found during the literature search. While the reason these three trials were not published was not determined, it does call into question the cause for a lack of publication or for further research on the topic.

There is, in fact, a noteworthy lack of follow-up research among all of the included trials. Only three authors appear to have conducted further research (Wachtel-Galor et al. 2004b; Noguchi et al. 2008b; Gao et al. 2003b;

2005a). It would seem likely that promising results would elicit further study, and the absence of further re-search raises some doubt about the ability to replicate positive results.

Another concern is the source of motivation for the research. It is not always easy to determine if research is funded in whole or in part by organizations with an incentive to find positive results. Because many of the included studies are testing the effectiveness of a specific brand of dietary supplement, such as Ganopoly or Senseiro, it is possible that there is an incentive to establish evidence for the health benefits of these products (Gao et al. 2002a; Ohno et al. 2013). This lack of objectivity can have an effect on the validity of even well-designed research (Jagsi et al. 2009).

Where reliable research methods are used, mushrooms produced as dietary supplements still lack standards for cultivation and preparation, as well as testing protocols needed to guarantee product quality (Sullivan, Smith, & Rowan 2006). The bioactivity of mushrooms can vary widely depending on the strain, growing conditions, developmental stages, and the parts of the mushroom that are consumed (Borchers et al. 2008). Extraction methods such as water temperature or ethanol concentration can also impact the bioactivity of the resulting product (Borchers et al. 2008). Even when these variables are carefully recorded and disclosed, the study results for a particular treatment cannot always be extrapolated to the general consumption of a mushroom species.

Finally, there are few regulations for dietary supplements that are sold in the United States. Clinical studies are not a requirement, and the active ingredients of many commercial mushroom products are not known. As a result, adulteration with other species is common (Wasser 2011). This provides another challenge to both consumers and health professionals when determining the effectiveness and safety of consuming these products.

The human trials included in this review vary greatly with regard to study design, preparation, dosage, and number of subjects, as well as the analysis and reporting of results. While many show interesting possibilities for the use of these three mushroom species in treating a variety of medical conditions, additional research using well-designed clinical studies and reliable statistical methods is still needed. Further double-blinded, placebo-controlled studies with large trial populations and well-standardized preparations are necessary to reliably establish the efficacy of these mushrooms as dietary supplements.

* Editor's note: To see the extensively detailed tables depicting the Clinical Human Studies for each of the three kinds of mushroom supplements, go to http://www.namyco.org/three_medicinal_mushroom_supplements.php.

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Obituary: Herbert A. Pohl

By Allein Stanley and Carlene Skeffington Cliver

On May 1, 2016 NAMA lost one of our most dedicated long-time members with the death of Herbert A. Pohl of Flemington, N.J. Even during his year-long battle with mesothelioma, he continued to serve as our treasurer with integrity and devotion.

Herb was born July 28, 1932 in Breman-Blumenthal, Germany. He grew up there during WWII before obtaining a scholarship to study as an exchange student at the University of Illinois at Champagne-Urbana. Herb earned his BA in engineering from the Illinois Institute of Technology. A trip to Chicago was the occasion of meeting his future wife Ursula. They returned to Germany and married in March of 1955, becoming an unbreakable team for their 61 years together and sharing Ursula's passion for mycology. In 1956 they emigrated to the US and Herb began his career with the Western Electric Company in Chicago working as a research engineer and department chief of the design team and later as CEO of Rame'-Hart Company, one of whose products is the egg inoculation machines for vaccines. The family grew with the births of son Knut and daughter Marion.

The family loved skiing and Herb was still skiing well into his 80's. He also loved gardening, another passion he shared with Ursula: she lavished her attention on the flower gardens while Herb concentrated mainly on the vegetable garden. Their grounds showcased their love and devotion. After his final retirement Herb had more time to share Ursula's love of mycology and became very involved in both the New Jersey Mycological Association and NAMA. He served as president of NJMA and following his term became the club's literature chairperson until the fall of 2015. He was elected treasurer of NAMA in 2011 and served in that position until his passing. His meticulous concern for our financial well-being enabled us to expand some of our projects and entertain possible new ventures. Deeply interested in reaching our goal of $100,000 in the NAMA Endowment Fund, it was Herb's hope to achieve this level during his lifetime. He organized the fund raising silent auctions of mycological paraphernalia at NAMA forays and could always be counted on to lend a hand when needed at mycophagy sessions during the twenty-five years Ursula has served as NAMA Mycophagy Chairperson. He applied his common sense and practicality to many other issues that arose for NAMA and his contributions (often quiet, thoughtful and often unnoticed) greatly strengthened our organization. Through his many NAMA forays and world-wide mycological travels, which included Australia, New Zealand, Tasmania, Thailand, Norway, Sweden, Spain and Scotland, Herbert and Ursula made many life-long friends. He will be missed by many in the mycological community and beyond.

Memorials made in his name to the NAMA Endowment Fund may be sent to Ike Forester, (as Interim Treasurer), PO Box 1107, North Wilkesboro NC 28659.

CARAMELIZED GIANT PUFFBALL BUTTER PUREE

MARCH 25, 2016 BY ALAN BERGO

http://foragerchef.com/caramelized-puffball-puree/

Generally speaking giant puffballs can be large, very large. Most of them that I find can't even be put in a refrigerator. I luck out since I have giant walk in coolers where storing food of any size is no problem at all. At home this poses an obstacle though. I have lots of friends that hunt mushrooms, and not surprisingly, many of them pass on the giant puffballs when they see them since storing them is tricky, which means they have to be eaten right away.

There are a couple options though, like storing them outside if it's in the fall and the temp drops down to a reasonable degree for storing them without freezing. You can also try slicing and dehydrating, and then powdering them, which works well but takes a long time.

Most often what I end up doing is preserving puffballs somehow. This year, I found a whole bunch by accident and needed a quick way to store them that would be quick and easy. I was thinking about the way that I make caramelized dairy based sauces, and also dulce de leche when a new way of treating these things hit me: I should puree the puffballs to cook out their water weight, then slowly caramelize the puree to deepen their flavor.
The caramelized puree ends up being a little weird looking during the cooking process, but the end result is fantastic, a smooth puree of puffball concentrate that takes up an amount of space in the freezer that's negligible-I cooked 25 lbs down to about 2 qts of puree.

Once the puree is made, your imagination is really the limit. Sauces, soups, stuffings, and compound butters I've made have all been excellent. Unlike some mushrooms, there isn't a hint of bitterness at all either, just smooth, buttery puffball. Did I mention you don't even need measurements to make it?

CARAMELIZED PUFFBALL BUTTER PUREE

Ingredients

- Puffball mushrooms
- Salt
- Lemon zest
- Parsley
- Chilled, diced unsalted butter, as needed
- Lard or oil, as needed
- Warm water, as needed for pureeing

Method

Preheat the oven to 300. Clean and peel the puffballs, then chop them into 1 inch cubes. Put the chopped puffballs into the biggest stockpot with a lid you have, then add a cup or two of water so the puffballs don't scorch on the bottom. Cover the pot, then turn the heat on medium, stirring occasionally, until the puffballs are wilted and have started to give up their water. At this point, the puffballs will have turned varying shades of nasty looking blue and gray, don't worry, this is natural. It happens when puffballs are exposed to moist heat.

Bring the butter and puffball puree to room temperature, then process together in a food processor until smooth and combined. Transfer the mixture to a mixing bowl and stir in the salt, lemon zest, juice, and parsley. Form the puffball butter into a 1 inch log, wrapping in plastic wrap, then label, date, and refrigerate until needed. It can also be frozen.

AN EXAMPLE OF HOW TO SERVE THE BUTTER. THIS WAS FROM A RARE BEEF DINNER AT THE SALT CELLAR IN 2015. SMOKED HANGER STEAK, DANDELION-SPINACH PUREE, PARISIENNE POTATOES, FRIED LICHENS, AND PUFFBALL BUTTER (placed on top of the steak).

Forager|Chef Alan Bergo, Executive Chef of the Salt Cellar in St. Paul, Minnesota. http://www.saltcellarsaintpaul.com/#auniquedestination, http://www.foragerchef.com/

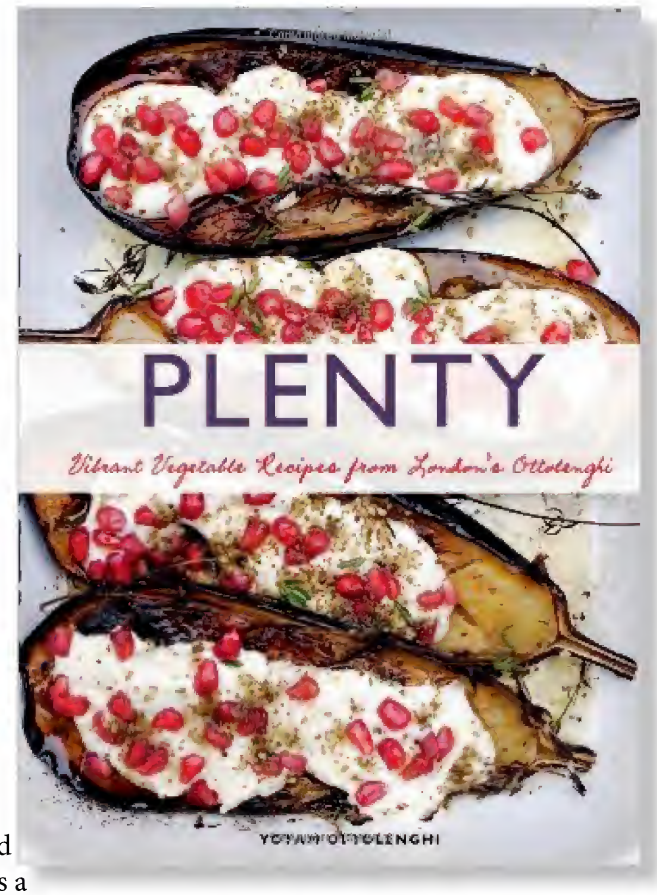
NORTH AMERICA *HEBELOMA* PROJECT CONTINUES

By Joel Horman

Thanks to all who contributed collections to this ongoing research project. Fungi Europaei has just published Henry Beker's, Ursula Eberhardt's, and Jan Vesterholt's monograph on Hebeloma, and the focus will now be on N.A. Representative current collections are needed, and we ask all to participate in this citizen science aspect of research. Joel Horman is serving as the N.A. collection point, and the submission process has been simplified so that FedEx return labels can be generated via email to enable donors to mail their collections without expense. To receive data collection forms to download, and to obtain shipping labels for your collections, email Joel at jlhorman@optonline.net.

New Tastes for Mushrooms in Yotam Ottolenghi's *Plenty*

By Barbara Ching and Jennifer Knox



This is our third recipe book review for *The Mycophile*, and it's been terrific to experience how different cooks approach mushrooms. Yotam Ottolenghi—a James Beard Award winner for International Cooking and author of *Ottolenghi: The Cookbook* (2008), *Plenty* (2010), *Jerusalem* (2012), *Plenty More* (2014), and *Nopi* (2015), approaches the mushroom in surprising ways.

Originally from Jerusalem, Ottolenghi entered a graduate program in philosophy in the Netherlands after a tour of duty in the Israeli army. He then abandoned academia for training at Le Cordon Bleu. A restaurateur in London, Ottolenghi is known for marrying the flavors of the Middle East with his adopted home in the west, earning a sort of cordon multicolore. Although he is an omnivore, his treatment of vegetables is unique—so much so that *Voyager*, *BMI Magazine* dubbed him "The Man Who Sexed Up Vegetables." And he does seem to consider mushrooms a vegetable; his second book, *Plenty: Vibrant Vegetable Recipes from London's Ottolenghi*, all the recipes are vegetar- ian, and mushrooms have their own chapter in the book.

We cooked four of the recipes in the "Mushrooms" chapter of *Plenty*:
- Mushroom ragout with poached duck egg
- Bánh xèo
- Stuffed portobello with melting taleggio
- Marinated mushrooms with walnut and tahini yogurt

and two from Ottolenghi's first cookbook, called *Ottolenghi*--after the chef and his restaurant:
- Portobello mushrooms with barley and preserved lemon
- Mixed mushrooms with cinnamon and lemon.

We also tried a recipe from *The Guardian* online:
- Mushrooms and chestnuts with za'atar.

Although there is a recipe for chanterelles and rice in *Plenty More* (2014), Ottolenghi doesn't think in great detail about the particular qualities of individual mushroom varieties. Of his relationship with mushrooms, Ottolenghi writes of a vivid memory without apparent concern for naming the mushroom: "When I was growing up, I knew only one edible mushroom – a wild variety that grows under the pine trees on the hills around Jerusalem. These would appear as if by magic through rotting pine needles after the first rains of early autumn. Though guided by my maternal grandmother, who grew up in Germany and considered herself an expert on mushrooms (as she did on many a subject), we'd often get to our mushrooms a bit late, by which time they had turned into gigantic, odd-looking things: shapeless, clogged with water and starting to decompose here and there.

After cleaning them, and cooking them down, two full sacks-worth would give us barely enough for four measly portions, which we flavored simply with olive oil and garlic and served with scrambled eggs. But even that was enough: the flavors of pine and soil were so deeply embedded in those mushrooms that they colored the entire eating experience. For me, those are to this day the very happy aromas of autumn." (The Guardian, 2015)

In the same multi-fungal spirit, the mushrooms used in these recipes are fairly standard and easy to find in most grocery stores—wild mixed, brown chestnuts (we substituted baby bellas or the pioppinis that come in the mixed mushroom cartons sold in chain groceries), porcinis, enokis, portobellos, buttons, oysters, shiitakes, and beeches. The other ingredients, however, may take some work to find like tahini, za'atar, kecap manis, skinned fava beans and chestnuts. If you like hunting for ingredients in Middle Eastern and Asian grocery stores as much as you like hunting mushrooms, these recipes will be right up your alley.

Technically, there's nothing too difficult. If you can make pancakes and fry an egg, you should be fine. We crossed Ottolenghi's cordon bleu-ish mushroom pithiviers off our list, and even the same filling, wrapped in parchment paper instead of puff pastry, seemed like needless hassle. Mushrooms, cream, etc.--Julia Child's been there, done that.

Well, we did make one French exception and are glad of it: the Mushroom ragout with the poached duck eggs was comfortable in the elegant and aspirational way of a goose down robe and silk pajamas. The technique is easy French—a carrot and onion saute before adding mushrooms, then reduced stock and wine, and finish with cream. Do all this at night. Although Ottolenghi didn't imagine this dish as an oatmeal replacement, the next day, sourdough croutons (aka miniature toast) and a poached duck egg make this concoction the best breakfast!

Don't worry—you can find duck eggs. Remember that we happily live in the middle of nowhere and can find duck eggs in two places—farmers markets and little Asian markets that mainly sell ramen and wilted produce to students. Go ahead and buy a dozen: duck eggs also make amazing homemade ice cream and greatly improve cake mix cakes.

Our two favorite recipes didn't involve "cooking" the mushrooms at all. Barbara's favorite was the marinated mushrooms with walnut and tahini yogurt. The technique of marinating mushrooms is used frequently in the Mediterranean, and we've used it in several Indian and Italian recipes. Acids from vinegar and citrus draw the liquid from the mushrooms and soften them without using any heat—like ceviché. In *Plenty*, the mushrooms are marinated in white wine vinegar and maple syrup—a surprising combo—but when you taste it, it makes sense! Marinate the mushrooms for an hour, toss in fresh fava beans, spoon the mix into small bowls, and top them with a superb tahini yogurt sauce flavored with garlic, toasted walnuts and dill. We both agreed that we would like to eat our way out of a vat of the sauce. We were out of sherry vinegar which the recipe called for, and instead used a pomegranate quince vinegar—it was a great call. It infused the mushrooms with extra fruitiness. The combination of the sweet, tangy mushrooms, the cool garlicky yogurt, and the toasted walnuts was incredible, and would make an easy yet dazzling starter for any dinner party.

Jennifer's favorite was Bánh xèo: a Vietnamese-style pancake made with rice flour, coconut milk and turmeric, stuffed with raw enoki mushrooms, bean sprouts, scallions, snow peas, fresh mint, Thai basil and cilantro, and topped with a sweet, spicy sauce. Ottolenghi wrote that he adapted the recipe from a restaurant in Hanoi, where "the freshness of the vegetables and herbs was mind-blowing." Getting all the ingredients together and chopped up might seem daunting, but if you're a SE Asian food fan, the final result is spectacular. Even amongst all the bold flavors, the enoki's clean earthiness really shines. It would work for a fairly labor-intensive breakfast, lunch or dinner. Even everyone in Jennifer's super-finicky family agreed.

Mushrooms and chestnuts with za'atar was a cinch to prepare. Roast a mix of hefty mushrooms with shallots

and hearty herbs—sage and tarragon—then toss with lemon and za'atar, a Middle Eastern staple spice blend made with thyme, oregano, marjoram, toasted sesame seeds and salt. The lemon and spice brightened the deep, earthy flavors of the mushrooms and herbs, and the final dish would fit in well on any mushroom aficionado's holiday table. Jennifer loved it; Barbara didn't care for the texture of the chestnuts as the dish cooled off (reminiscent of biting into a soap ball), but you could easily leave those out or keep the serving dish warm or covered.

We approached the mixed mushrooms with cinnamon and lemon much like a science experiment—an assignment rather than a craving. The idea of pairing cinnamon with mushrooms is so far out of the ballpark of western tastes that we had no cognate in our palates for what the flavors in the final dish would be, but served cold, it was almost as good as the mushrooms with yogurt tahini sauce. Cooked in olive oil with plenty of garlic and cinnamon sticks (!), then tossed with lemon juice, pepper, and parsley, the texture is silky and the taste bright. Especially surprising is how wonderful the long stems of beech mushrooms taste with this treatment. Ottolenghi listed enoki among the mixed mushrooms to use—a specification which we ignored, but this recipe would really enhance those long stems.

Like Charlie Brown, who can always be lured into kicking the football that Lucy always pulls away from him, we always take a chance on Portobellos—stuffed, roasted, grilled or even Portobellos pretending to be burgers or french fries. We always think that this time it will be different, this time we'll get a umami-oozing giant mushroom. But Ottolenghi Lucy van Pelted* us on his versions–one stuffed with a very traditional barley and given a novel twist with bits of preserved lemon, the other loaded with sun-dried tomatoes and melted asiago. In Charlie's immortal words, "Arghh." Or as Barbara wrote in her notes on *Eat Your Books* (www.eatyourbooks.com), "Meh-shrooms." Even Ottolenghi can't sex up the dirty water mush that is the Portobello.

We noticed that the herbs dramatically change in taste from recipe to recipe, depending on the ingredients around them. Herbs are a key ingredient rather than a garnish in all of the recipes. For example, tarragon—a strong herb—is used in both marinated mushrooms with yogurt and in the mushrooms and chestnuts with za'atar. In the marinated dish, the pomegranate quince vinegar mingled with the tarragon for a bright, fruity flavor, but in the chestnut dish, the tarragon gave off a decidedly deeper note. The lemon and cinnamon mushrooms incorporated both cooked and raw parsley--each with their own flavor contribution.

With the lucky exception of the wild mushroom ragout, Ottolenghi's more traditional western recipes paled in comparison to his Middle Eastern and Asian recipes. So if you're looking to spice up your myco-culinary repertoire, try a dish from Ottolenghi, and dare to go for the dazzlers. You can find online versions all over the internet, with loads of user comments, or check out his books from your public library.

*Editor's note: Lucy van Pelt is the 'bossy' character from the *Peanuts* comic strip.

Bio of NAMA Regional Trustee for Appalachian Region: Nancy Ward

I am currently president of the West Virginia Mushroom Cub, or Queen as I prefer to be called. I am also called Queen of the Spo-Hos by Bill Roody, short for Spore Whore, which is also the name given by my husband to all the officials of our club. Gary Lincoff, Bill Roody, Donna Mitchell and Walt Sturgeon are all honorary spo-hos. The West Virginia club was resurrected 12 years ago by Shelly Conrad, Nelle Chilton, Martha Hopper, and myself. Our claim to fame is our annual foray which has grown from a small gathering to a major event. My interest in mycology began 20 years ago while visiting the west coast. It was slow going at first as I had no guidance, but I joined NAMA and then the WPMC. I began traveling to forays and have been passionate about all things fungal ever since. My photographs have appeared in several publications including Gary Lincoff's *The Complete Mushroom Hunter*. I also create wreaths and other items using polypores. I have recently retired and hope to devote more time to mycology.

In California, Poisonous Death Cap Mushrooms Are The Forager's Bane by Gabriela Quiros for NPR, March 20, 2016

Donna Davis thought she had hit the jackpot with the two bags of mushrooms she collected in the woods of Northern California's Salt Point State Park. Instead, she ended up in the hospital, facing the possibility of a liver transplant, after mistakenly eating a poisonous mushroom known as the death cap.

The 55-year-old life coach and her boyfriend had collected chanterelles, matsutakes and hedgehog mushrooms, all sought-after edible species.

That night, Davis made mushroom soup for herself, her boyfriend and a group of their friends. "It was amazingly delicious," Davis says. So good, in fact, that she had two bowls.

And she felt fine. Until the next afternoon.

"I slept for three days," says Davis, of her illness in December 2014. "I was kind of in and out of it, just drinking water and not being able to really hold anything down."

When she dragged herself to a mirror, she realized she had turned yellow.

Davis isn't the first or only forager who has fallen victim to the death cap.

Between 2010 and 2015, five people died in California and 57 became sick after eating these unassuming greenish mushrooms, according to the California Poison Control System. One mushroom cap is enough to kill a human being, and they're also poisonous to dogs.

"Dogs die in droves," says Debbie Viess of the Bay Area Mycological Society.

The trouble is, people feel fine for six to 12 hours after they've eaten death caps, says Dr. Kent Olson, the co-medical director of the San Francisco Division of the California Poison Control System. But during that time, a toxin in the mushroom is quietly injuring their liver cells. Patients then develop severe abdominal pain, diarrhea and vomiting.

"They can become very rapidly dehydrated from the fluid losses," says Olson. Dehydration can cause kidney failure, which compounds the damage to the liver.

When Davis went to the hospital, doctors put her on intravenous fluids. They also pumped her stomach full of activated charcoal to help absorb the poison out of her body, although some doctors question the usefulness of this treatment when many hours have elapsed since the poisoning occurred.

For the most severe cases, the only way to save the patient is a liver transplant, says Olson. (Davis didn't end up needing one and went home before Christmas.)

Researchers are looking for better treatments. One group of scientists is testing the drug silibinin, which can protect a patient's liver and make a transplant unnecessary.

And other scientists are trying to learn more about death caps — hoping to find a weakness they can exploit to defeat them.

The death caps arrived in California from Europe as early as the 1930s and '40s, says Anne Pringle, a biologist at the University of Wisconsin, Madison. She discovered this timeline through genetic testing of death

cap samples collected in California during this era. She says death caps likely sneaked into California from Europe attached to the roots of imported plants — and they got really comfortable, spreading all over the state.

Through genetic testing, Pringle is trying to better understand how death caps propagate, and how long they live. In mushroom-producing fungi like the death cap, much of their body lies under the earth's surface. (The mushrooms are just there to help the fungus spread spores and reproduce.) Pringle wants to know how long the underground bits last — would simply plucking the mushrooms to prevent them from spreading their spores through the air be enough to kill off individual death cap fungi? Or is the death cap more resilient — does each individual develop a vast underground network that would be near-impossible to eradicate?

For now, it's looking like the death caps are here to stay.

With this year's mushroom foraging season well underway, health workers and experts are warning aficionados to be careful. Death caps, which are abundant in California, can easily be confused for other edible mushrooms, growing mainly under coast live oaks. Death caps have also been found under pines, and in Yosemite Valley under black oaks.

And it's not just amateurs who mistake death caps for edible mushrooms like coccora or paddy straws. "I've seen expert mycologists arguing good-naturedly about whether a mushroom they were looking at was the deadly one," says Dr. Kent Olson, co-medical director of the San Francisco Division of the California Poison Control System. "At certain stages of development, the mushrooms can be confused."

In hindsight, Davis thinks she confused young death cap mushrooms — which have a rounded yellowish-green cap — for hedgehog mushrooms, which are yellow and rounded.

Hedgehog and death cap mushrooms are fairly different-looking. While hedgehogs don't have any gills — ribs under the mushroom cap — death caps do have gills.

"It is easy for folks to make ID mistakes," says Viess, "which is why I encourage strong caution for beginners."

Mature death cap mushrooms are big, smooth and an olive green color. And if you pull one out of the ground, you'll see it has a little cup that holds it up.

"Assume nothing, and learn for several seasons before you eat any wild mushrooms," warns Viess from the Bay Area Mycological Society. "Use good, regional books, find a mentor, and have your initial IDs checked by more knowledgeable and trusted identifiers."

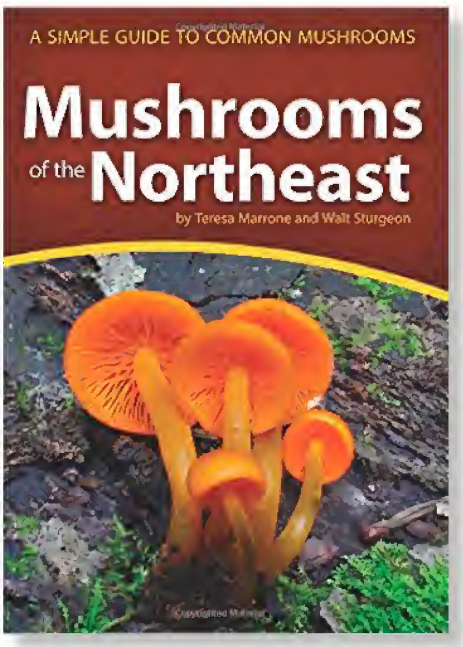
As for Davis, after temporarily losing her taste for mushrooms, she is now looking forward to foraging again. But she says she'll be much more cautious.

"I don't need to collect all that I see," she says. "I'm good with just, you know, a handful."

Amanita phalloides, the Death Cap by D.S. http://www.npr.org/sections/thesalt/2016/03/20/470825175/in-california-poisonous-death-cap-mushrooms-are-the-foragers-bane

Mushrooms of the Northeast: *A Simple Guide to Common Mushrooms*

Teresa Marrone and Walt Sturgeon
2016, Adventure Publications, Cambridge, MN
www.adventurepublications.net / 1-800-678-7006
ISBN 978-1-59193-591-9 (288 pages, softcover, $16.95)



This is a small (roughly 4.5 × 6 inches) guide that, as the title states, deals with mushrooms commonly encountered in the Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Ohio [formerly part of the Midwest], Pennsylvania, Rhode Island, and Vermont). It "was written with the beginning mushroom enthusiast in mind." The publisher's notes suggest that over 400 species are covered but that number must include pretty much every species mentioned anywhere, as the number of well-described and illustrated species is much smaller. (I get about 300, although an exact count is difficult because of the number of species groups utilized.) Nearly all the species also occur outside the subject area and are covered in many other books. If this sounds familiar, it should. This new guide from Adventure Publications is nearly identical (some of the text in fact is identical) to the earlier *Mushrooms of the Upper Midwest: A Simple Guide to Common Mushrooms* by Teresa Marrone and Kathy Yerich (reviewed in the Jan-Feb 2015 *Mycophile*).

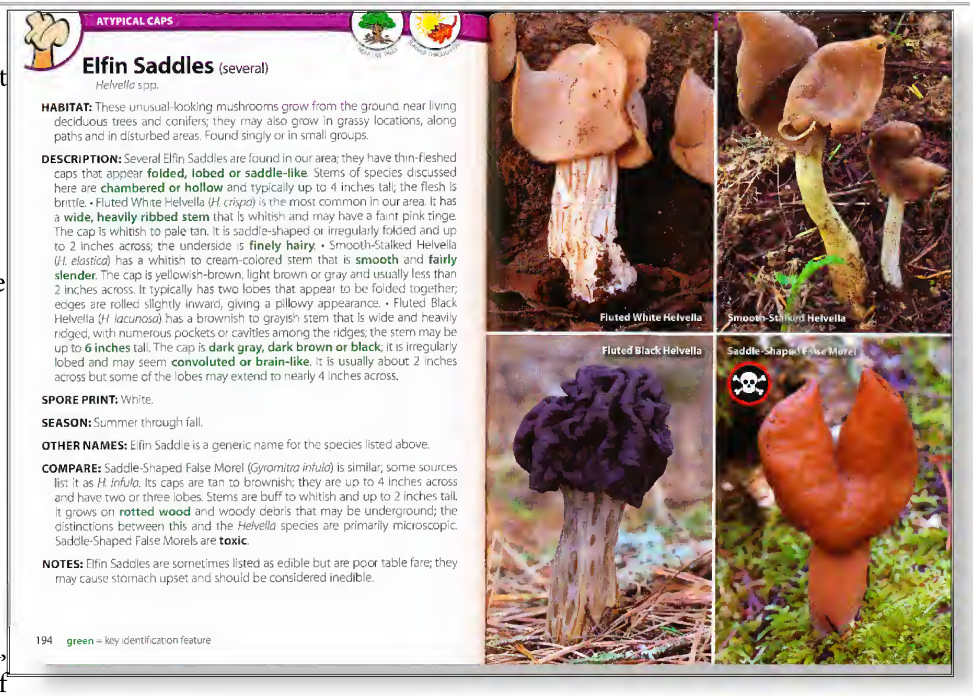
In addition to the previous mushroom guide, Teresa Marrone has written a number of outdoor-themed books as well as cookbooks featuring wild foods. She lives in Minneapolis. Walt Sturgeon, from eastern Ohio, is well known to amateur mushroom hunters as a result of his many activities with NAMA, NEMF, the Ohio Mushroom Society, and numerous local clubs and forays. Both contributed photographs to the project, along with a large number of other photographers.

The introductory material is brief, comprising only about 15 pages. It includes the rationale behind the book, an explanation of what mushrooms are and how to look at them, cautions for eating them, and a bit of basic fungus biology. This is followed by an explanation of how best to use the book, a description of the ten morphological groups (cap and stem with gills, cap and stem with pores, coral and club fungi, etc.) used to organize the Mushrooms Grouped by Type section of the book, and the species accounts. A list of books and websites, glossary, and index follow the species treatments.

The species accounts occupy 244 pages, broken down into three main sections—Top Edibles, Top Toxics, and Mushrooms Grouped by Type. Other than the description of the morphological types, there are no keys or other identification aids. The reader is directed to look for picture matches, starting with the morphological groups. Unfortunately, separating out the main edible and poisonous species makes the user have to look in three different sections of the book before deciding whether (s)he has found a match for the mushrooms in hand. Within the morphological groups, the species are organized by color, proceeding from light to dark, which leads to juxtapositions such as a tiny xeromphalina followed, in turn, by a red-gilled cort, a group of lactarius, and a leratiomyces, which is confusing for someone with a bit of experience and makes it hard for a beginner to begin developing a feel for the Friesian genera that form the basic framework for learning mushroom identification.

The "species" accounts include a number of groups, such as morels, toxic boletes, and earthstars, in addition to descriptions of single species. The content of the entries varies. The headings are all common names, with the scientific names in a much smaller font beneath them. Information categories include Habitat, Description, Spore print, Season, Other names, Compare, and Notes although, for many species, not all are included. The page edges are color-coded to facilitate finding the edibles (green), toxics (red), and morphotype (ten different colors) sections. The pages also include several icons for those same groupings, plus habitat and fruiting season. I didn't find the icons useful as they merely repeat

information in the descriptions and also include adjacent tiny-font text explaining their meanings. The more important features of the fungus are highlighted in the text through use of a colored boldface font. The photographs vary in size from a whole page down to roughly one-eighth of a page. They are of uneven quality, although most are good and show the key features well. Some are excellent, but others are underexposed, lack sharp focus, have inaccurate color cast, or fail to show necessary identification features.


ATYPICAL CAPS

Elfin Saddles (several)

Helvella spp.

HABITAT: These unusual-looking mushrooms grow from the ground near living deciduous trees and conifers; they may also grow in grassy locations, along paths and in disturbed areas. Found singly or in small groups.

DESCRIPTION: Several Elfin Saddles are found in our area; they have thin-fleshed caps that appear **folded, lobed or saddle-like**. Stems of species discussed here are **chambered or hollow** and typically up to 4 inches tall; the flesh is brittle. • Fluted White Helvella (*H. crispa*) is the most common in our area. It has a **wide, heavily ribbed stem** that is whitish and may have a faint pink tinge. The cap is whitish to pale tan. It is saddle-shaped or irregularly folded and up to 2 inches across; the underside is **finely hairy**. • Smooth-Stalked Helvella (*H. elastica*) has a whitish to cream-colored stem that is **smooth** and **fairly slender**. The cap is yellowish-brown, light brown or gray and usually less than 2 inches across. It typically has two lobes that appear to be folded together; edges are rolled slightly inward, giving a pillowy appearance. • Fluted Black Helvella (*H. lacunosa*) has a brownish to grayish stem that is wide and heavily ridged, with numerous pockets or cavities among the ridges; the stem may be up to **6 inches** tall. The cap is **dark gray, dark brown or black**; it is irregularly lobed and may seem **convoluted or brain-like**. It is usually about 2 inches across but some of the lobes may extend to nearly 4 inches across.

SPORE PRINT: White.

SEASON: Summer through fall.

OTHER NAMES: Elfin Saddle is a generic name for the species listed above.

COMPARE: Saddle-Shaped False Morel (*Gyromitra infula*) is similar; some sources list it as *H. infula*. Its caps are tan to brownish; they are up to 4 inches across and have two or three lobes. Stems are buff to whitish and up to 2 inches tall. It grows on **rotted wood** and woody debris that may be underground; the distinctions between this and the *Helvella* species are primarily microscopic. Saddle-Shaped False Morels are **toxic**.

NOTES: Elfin Saddles are sometimes listed as edible but are poor table fare; they may cause stomach upset and should be considered inedible.

Fluted White Helvella

Smooth-Stalked Helvella

Fluted Black Helvella

Saddle-Shaped False Morel

194 green = key identification feature

As was the case with the first book, the authors emphasize the value of scientific names and the limitations of common names, but then use common names, rather than scientific ones, in the main headings, photo captions, and text. Perhaps few users would read the book from cover to cover but, in my doing so, it got very annoying to read over and over again that "this species is mycorrhizal, growing in symbiotic association with living trees" and "they are saprobes, getting nutrients from dead organic matter." The mushroom lifestyle terms are explained in the introduction and they are included in the glossary so there is no need to explain them nearly every time they are used in the descriptions.

The information presented generally is accurate. However, there are a few glitches. Using the scientific names to refer to mushrooms is not "taxonomy." *Omphalotus illudens*, the jack o' lantern of eastern North America, is said to have caused deaths. If so, that is news to me and those knowledgeable fellows on NAMA's Toxicology Committee. Ditto for *Coprinellus micaceus*, the mica cap, causing the "Antabuse" reaction. The black clinker mass that is chaga is not a shelf with pores—the actual fruiting body is rarely seen. Several of the glossary definitions are either incorrect (e.g., "mycology" [it is the study of fungi, not the study of mushrooms], "volva," and "white rot") or not very clear (e.g., those for "genus" and "kingdom").

Nevertheless, like its predecessor, this is not a bad little book. It isn't very expensive and using it might help a beginner decide whether mushrooms are something worth learning more about. However, I'm skeptical about how well it will help people start learning to identify mushrooms. I fear that not grouping the species by the traditional Friesian genera will prevent the newcomers from beginning to develop a feel for what, for example, an amanita, russula, or cortinarius is, and that is an essential first step in becoming skilled at mushroom identification. As for mushroomers with some experience (remembering that this is not the book's target audience), nearly all the species can be found in many other field guides, so adding this to an existing library would probably not increase one's ability to identify many things. However, if your library is still small, this could be a handy addition.

Steve Trudell

Note to Contributors of Book Reviews for *The Mycophile*:
The editor requests that NAMA members wanting to write a book review for the newsletter kindly first contact Steve Trudell, Chair of the Literature Committee and member of the Editorial Committee at (mycecol@u.washington.edu). Steve plans which books to review in advance of submitting them for publication in the newsletter. He consistently provides us with bi-monthly reviews and understandably wants to avoid allocating his preparation time to the same books being reviewed and submitted by others.

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Change Service Requested

Newsletter of the North American Mycological Association
THE MYCOPHILE

Mushroom of the Issue:
Agaricus endoxanthus

Typically a tropical species, *Agaricus endoxanthus* is widely distributed across several continents. It has been found in greenhouses in Europe and is known to grow in Hawaii.

I first discovered this species growing outside in nature here in Sarasota, Florida in June 2012. I knew immediately it was something new and different that I had never seen before myself, and had never even seen in photographs. I was fortunate to have my camera with me that day and documented several specimens growing outside at a local botanical garden. After some research and contacting numerous mycologists, it was confirmed by Rick Kerrigan to be *Agaricus endoxanthus*.

This species of *Agaricus* has some of the same distinguishing characteristics as *A. xanthodermus* in that it stains yellow and has the same phenolic odor.

The pinwheel looking feature is from radial cracking from the center of the cap to the margin and is one of the most distinguishing features of this beautiful mushroom.

According to Rick Kerrigan, this was the first time this species was found growing in nature in the 49 states (excluding Hawaii). I have now found this growing in four separate locations in and around Sarasota and have heard reports of it being found in Gainesville and close to the Florida/Georgia border, so it is creeping its way north. Keep your eyes open; it may show up in your neck of the woods any day now.

Photos and description by Mary Smiley